New Jersey Stormwater
Best Management Practice Manual

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CHAPTER 8

Maintenance and Retrofit of Stormwater Management Measures

Maintenance of Stormwater Management Measures

Both research and experience has shown that regular and thorough maintenance is necessary for structural and nonstructural stormwater management measures to perform reliably and effectively. In addition, a review of the current NJDEP Stormwater Management Rules (N.J.A.C. 7:8) and the stormwater management measures offered in this manual to address them will indicate that, in general, most if not all of these measures will retain more water for longer periods of time than heretofore required. While such conditions are justified by increased measure effectiveness, they can also be seen to heighten the potential for increased mosquito breeding if they are not regularly inspected and maintained.

In response to these needs, the NJDEP Stormwater Management Rules state that a maintenance plan must be developed for all new stormwater management measures in accordance with this chapter. This maintenance plan must contain specific preventative and corrective maintenance tasks, schedules and cost estimates as well as a listing of key maintenance personnel, including the name and address of the individual with overall maintenance responsibility.

To assist in developing a maintenance plan, additional information regarding the inspection and maintenance of stormwater management measures is provided in the NJDEP's Stormwater Management Facility Maintenance Manual. This information includes maintenance tasks and equipment, inspection procedures and schedules, owners' responsibilities, and design recommendations to minimize and facilitate inspection and maintenance tasks.

Required Maintenance Plan Procedures

1. Copies of the maintenance plan must be provided to the owner and operator of the stormwater management measure and to all reviewing agencies. A copy should also be provided to the local mosquito control or extermination commission upon request.
2. The title and date of the maintenance plan and the name and/or title of the person with overall maintenance responsibility and their address must be recorded on the deed of the property on which the stormwater management measure is located. Any change in the name or title must also be recorded on the deed, particularly if there is a change of property ownership.

3. The maintenance plan must be evaluated for effectiveness at least annually and revised as needed.
4. A detailed written log of all preventative and corrective maintenance performed at the stormwater management measure must be kept, including a record of all inspections and copies of maintenance-related work orders.
5. The person with overall maintenance responsibility must make the maintenance plan, logs and other records available for review upon request from a public entity with jurisdiction over the activities at the site.

Required Maintenance Plan Contents

1. The names, addresses and telephone numbers of the property owner and the name and/or title of the person responsible for overall maintenance of the stormwater management measure. If the plan identifies a party other than the owner or developer as having responsibility for maintenance (i.e., a public entity or homeowners' association), the plan must include a copy of the other party's written agreement to assume this responsibility. This agreement must include a copy of any ordinance or regulation that requires the owner or developer to dedicate the stormwater management measure and/or it maintenance to the other party.
6. A schedule of maintenance inspections. Detailed inspection schedules and information for specific structural BMPs are presented in Chapter 9. This information must also be included in the maintenance plan.
7. Maintenance tasks such as removal of sediment, debris, trash, snow and ice, and mowing and pruning of vegetation. Detailed maintenance information for specific structural BMPs is presented in Chapter 9. This information must also be included in the maintenance plan.
8. Corrective information to address problems found during maintenance inspections, such as restoration of eroded areas, repair or replacement of stormwater management measure components, restoration of vegetation, and repair or replacement of nonvegetated linings.
9. Equipment necessary to perform the maintenance tasks.
10. Cost estimates of the inspection and maintenance tasks.

Maintenance Plan Considerations

In addition to the above, the maintenance plan must address the following issues:

1. **Access:** All stormwater management measures components must be readily accessible for inspection and maintenance. Therefore, access must be provided to the entire stormwater measure via roadways and paths. Trees, shrubs and underbrush must be pruned or trimmed as necessary to maintain this access. This includes pathways through the vegetation along permanent pool perimeters, including aquatic benches, to allow for the inspection and control of mosquito breeding.

   Inspection and maintenance easements connected to the street or right-of-way should be provided around the entire facility. The exact limits of the easements and right-of-ways should be specified on the project plans and included in the maintenance plan. Access roads and gates should be wide enough to allow passage of necessary maintenance vehicles and equipment, including trucks, backhoes, grass mowers and mosquito control equipment. In general, a minimum access roadway width of 12 feet inside a minimum right-of-way width of 15 feet is recommended. To facilitate entry, a curb cut should be provided where an access road meets a curbed roadway.

To allow for safe movement of maintenance vehicles, access ramps should be provided to the shoreline or bottom of all facilities with side slopes greater than three feet in height. Access ramps should not exceed 10 percent in grade and should be suitably stabilized to prevent damage by vehicles and equipment. Turnarounds should be provided where backing up is difficult or dangerous. To expedite overall maintenance, vehicle and equipment staging areas should be provided at or near each facility site.

2. **Training of Maintenance Personnel:** Depending on the size, character, components and location of a stormwater management measure, maintenance personnel may require specialized training to ensure that the measure is maintained in a manner consistent with its function. Such training may address specialized inspection or maintenance tasks and/or the operation of specialized maintenance equipment.
3. **Disposal:** Collection and disposal of sediment, debris and trash from stormwater management measures must comply with local, state and federal waste handling and disposal regulations. All collected material must be sent to appropriate disposal/recycling facilities.
4. **Aesthetics:** The safety, needs and aesthetic preferences of the adjacent community can help determine the type, amount and frequency of necessary maintenance.
5. **Emergency Maintenance:** Emergency maintenance and repairs must be performed in a timely manner.
6. **Safety:** Development of a stormwater management measure design and the inspection and maintenance tasks necessary to keep it functioning reliably must include considerations for the safety of inspection and maintenance personnel who will be working in or near the measure.

Retrofit of Existing Stormwater Management Measures

Incorporating new or expanding existing stormwater management measures can reduce some of the adverse stormwater quantity and/or quality impacts caused by an existing land development. Stormwater management measures can be dramatically improved and downstream waterbodies protected through effective retrofitting.

Beginning in the 1970s, many new developments were constructed with stormwater detention facilities. Many of these facilities were built to control the stormwater quantity impacts of the 10 year, 25 year, and/or 100-Year storms. However, smaller storm events that are responsible for the majority of stormwater quality and streambank erosion problems may not have been addressed.

Existing stormwater management measures can be retrofitted to improve their effectiveness for both stormwater quality and quantity control. Another important benefit of retrofitting is the opportunity to correct site nuisances, maintenance problems, and aesthetic concerns. Retrofitting can also allow a community to keep pace with new stormwater management regulations or objectives. It can also help a community address a particular stormwater quantity or quality problem that has developed as a result of deficiencies in their existing stormwater regulations or has been identified through a regional plan or TMDL. Addressing such existing problems through the construction of new stormwater management measures at future land developments may be impractical or even impossible, leaving retrofitting as the only effective technique.

In addition to such basic considerations as need and cost, three important factors must be considered when evaluating retrofit possibilities: health and safety, effectiveness and maintenance. All three should be thoroughly reviewed before undertaking a retrofit to help justify its initial cost and effort and ensure its long term success.

1. **Health and Safety:** A retrofit must not increase health and safety risks in any way. For example, the storage volume in an existing detention basin used for stormwater quantity control must not be reduced to provide a new permanent pool for stormwater quality enhancement without certainty that the lost quantity storage will not adversely increase downstream flooding or erosion. Similarly, an existing wet pond must not be converted to a constructed wetland for enhanced stormwater quality control if the potential for mosquito breeding will increase significantly without adequate additional control measures.

2. **Effectiveness:** In many retrofit situations, it will not be possible to upgrade the stormwater management measure to meet all contemporary stormwater quality and quantity standards. This lack of an absolute performance standard means that relative performance improvements for a range of retrofits must be evaluated to determine which retrofits are both effective and viable. As a result, the final combination of retrofits selected for an existing stormwater management measure will have to be based on their relative rather than absolute effectiveness. In such relative determinations, both the costs and benefits of the retrofits become a more important factor than when an absolute performance standard is used.
3. **Maintenance:** It should be expected that, if a retrofit will increase a stormwater management measure's pollutant removal capability, it might also increase the rate and volume of sediment, trash and debris accumulation in the measure. In addition, the chemical or biological composition of this sediment may also be of significantly lower quality, and perhaps either hazardous or toxic, than the sediment previously captured. Finally, the retrofit may increase the number and/or complexity of components in an existing stormwater management measure. All of these factors can cause increases in the level, frequency, complexity, and/or cost of the present inspection and maintenance efforts provided at the existing stormwater management measure. Increased staffing, improved equipment, and more specialized training may be required to properly maintain the new, retrofitted measure. Therefore, the extent and impacts of any increased inspection and/or maintenance requirements should be determined and thoroughly evaluated.

Once a retrofit has been determined to be safe, effective and manageable, two basic approaches can be followed: modify an existing stormwater management measure or construct a new or additional one. Basins designed primarily for flood control may be retrofitted to enhance stormwater quality and groundwater recharge benefits. For example, the pollutant removal rates of an existing detention basin can be improved by creating an extended detention wetland. However, as noted above, the retrofit must maintain the basin's existing flood and erosion control capabilities. As a result, the basin's total storage volume may need to be increased. In addition, new measures like infiltration systems, permeable paving, and bioretention systems can be introduced at sites where the soil permeability and depth to the seasonal high water table are suitable. Areas for such new measures include parking lot islands, vacant land, and roadside swales.

In addition to structural measures, nonstructural stormwater management measures can also be used to enhance the stormwater management of a site. Roofs are one of the largest sources of concentrated runoff from commercial developments. Clean roof runoff can be direct by downspouts to a dry well, disconnecting a portion of the runoff from the storm sewer system and both reducing runoff volume and restoring groundwater recharge. Flat roofs can be retrofitted with vegetation, which can reduce the stormwater impacts of the building. Overflow parking areas and firelanes can utilize more permeable paving systems, which can also reduce runoff and enhance recharge. Filter strips and vegetative buffers can be incorporated into existing developments where runoff from paved or intensely managed turf areas can be discharged across vegetated or forested filters. This may require the removal or slotting of existing curbs along the edge

of parking lots or roads. Parking lots with vegetated aisle dividers may be particularly amenable to this type of filter strip application.

In addition, catch basins and drain inlets that are part of a traditional 'curb and gutter' stormwater collection system can be retrofitted with one of several different manufactured treatment devices that catch sediments, trash and organic matter. These proprietary devices are particularly useful in areas with limited space. Several varieties of manufactured treatment devices can be installed at strategic locations near a discharge point or as a pretreatment to an existing basin. Additional information regarding manufactured treatment devices is provided in Chapter 9.

It is important to note that, although retrofitting can effectively reduce existing stormwater quality and quantity problems and restore groundwater recharge, additional and often different facility maintenance is commonly needed. This important issue must be considered when evaluating retrofit options.

Finally, education should also be considered as a retrofit component. Control of household wastes, fertilizers and pesticides can dramatically reduce concentrations of problem pollutants that adversely affect downstream water quality. Prevention is the best method for eliminating pollutants from stormwater runoff. Chapter 2 provides important information regarding stormwater pollution prevention.